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(54) Telephone calling card service system integrating virtual destination numbers

(57) A telephone calling card (prepaid or postpaid) service system with an intelligent network (IN) for automated call processing novelly associates a Virtual Destination Number (VDN) with each calling card account to significantly broaden service options to calling card account subscribers. As a result, a calling card customer can combine calling card service with voice mail service and call forwarding service, which was heretofore not possible. More particularly, the additional services include: the ability of a calling card customer to check a voice mailbox associated with the calling card VDN; the ability of a calling card customer to create and change voice mail greeting options; the ability of a calling card customer to establishing a call forwarding number; and the ability of third parties dialing the VDN to either be connected to a call forwarding number if established, or access the calling card account subscriber's voice mailbox.

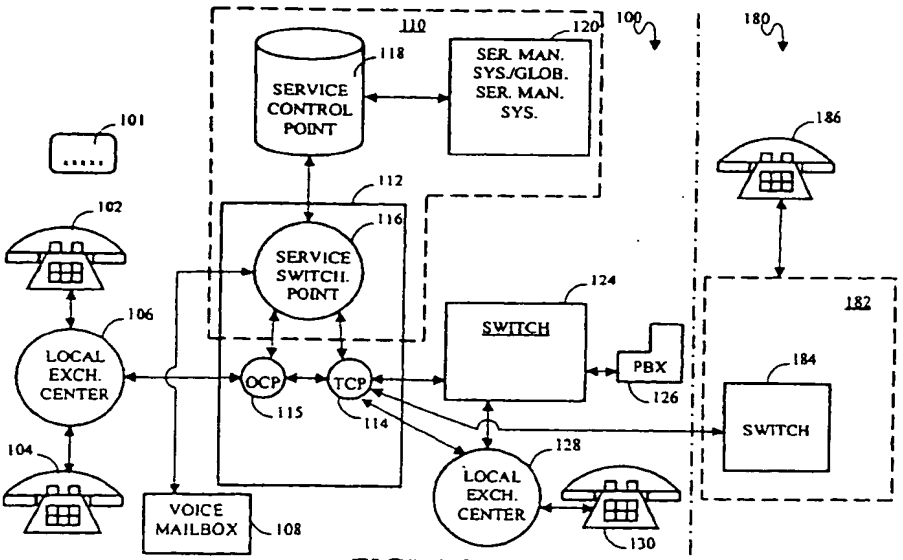

FIGURE 1

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an assigned Virtual Destination Number (VDN), and the SCP control unit, upon receipt of customer information collected via the origination telephone line, compares information and determines whether a telephone call is authorized; and

the SCP being adapted to provide additional services to the customer and third parties based upon the VDN.

[0011] The present invention also provides, in a telephone calling card service system, a telephone calling card service method for processing telephone calls to be charged to calling card accounts, the method at least including the steps of:

via input telephonic devices coupled to origination telephone lines, at least transmitting a calling card account card number, security information, and a destination telephone number;

via an automated intelligent network (IN) coupled to origination telephone lines, processing calling card account telephone calls, the IN at least including a service control point (SCP), and the SCP at least including an SCP control unit and an SCP database coupled to the SCP control unit, authorizing the routing of calling card account telephone calls; and

via at least one switch operatively coupled to the origination telephone line and to the SCP, routing calls authorized by the SCP to a destination number specified by the customer;

the SCP database at least storing system account numbers, corresponding security information and an assigned Virtual Destination Number (VDN), and the SCP control unit, upon receipt of customer information collected via the origination telephone line, comparing information and determining whether a telephone call is authorized; and

providing additional services to the customer and third parties based upon the VDN.

Brief Description Of The Drawing Figures

[0012] Features and advantages of the present invention will become apparent to those skilled in the art from the description below, with reference to the following drawing figures, in which:

Figure 1 is a schematic block diagram of the basic hardware for the present-inventive telephone calling card service system, which system assigns a virtual destination number to each calling card account subscriber;

Figure 2 is a flowchart/algorithm detailing the call flow of the aspect of the present invention allowing a customer to check a voice mailbox;

Figure 3 is a flowchart/algorithm detailing the call flow of the aspect of the present invention allowing a customer to create or update a voice mail greeting;

Figure 4 is a flowchart/algorithm detailing the call flow of the aspect of the present invention allowing a customer to establish a call forwarding number; and

Figure 5 is a flowchart/algorithm detailing the call flow of the aspect of the present invention allowing a third party to, by dialing a VDN, either connect to a calling card customer's call forwarding number if established, or connect to the calling card customer's voice mailbox, if there is no call forwarding number established for the VDN.

Description Of The Preferred Embodiments

1. General Description

[0013] The basic hardware of the telephone calling card service system 100/180 is illustrated in Figure 1.

[0014] The system 100/180 combines a domestic network 100, as in the United States, for example, and a foreign network 180, as in Europe, for example. The system 100/180 includes a variety of telephonic input devices as would be common in a general telephone system. For example, a user can connect to the network 100 using such devices as common telephones 102 and 104. As an example, a user can attempt to complete a calling card transaction using a telephone which is part of a private branch exchange (PBX) as is known in the art. The telephones include alphanumeric keypads for inputting Dual-Tone-Multi-Frequency (DTMF) signals, or the like, as is common.

[0015] A telephone calling card 101 (or a card number plus PIN) at least stores a card number corresponding to a calling card account, and is used to facilitate a call placement through the system 100/180.

[0016] Local exchange centers (LECs) such as the one 106 handle all initial calls, and route calls to a switch 112 when a service access code (SAC) is received, either from the user or from a card reader (not shown) integrated into the telephone terminals. The access number indicates to the LEC that the user desires to make a calling card transaction.

[0017] An Originating Call Processor (OCP) 115 within the switch 112 transfers the call to a service switching point (SSP) 116. The SSP is part of an intelligent network (IN) 110, capable of automated processing of calling card transactions. A Terminating Call Processor (TCP) 114 handles the termination of call

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processing once a call has been connected to the destination number.

[0018] The SSP 116 is linked to a service control point (SCP) 118. The SCP 118 has an extensive data-base storing calling card numbers supported by the system and their associated account numbers, current account status information, and any other information used to facilitate transactions. The SCP 118 performs service logic and provides the SSP 116 with call handling instructions, as provisioned by the system and the calling card subscriber. The SSP 116 also updates the information stored in the SCP 118 (such as new charges to the account) as is appropriate. It will be appreciated by those skilled in the art that the SCP 118 can be implemented as a networked database, not limited to one geographic location.

[0019] Once a calling card user is connected to the SSP 116, the SSP queries the SCP 118 for account security information pertaining to the calling card upon which the transaction is based. The SSP 116 also contains a master clock (not shown) for keeping track of current times and dates. In some embodiments, the master clock calibrates other clocks used to measure such quantities as the elapsed time of calls.

[0020] Once the SCP 118 receives a query from the SSP 116, the user is prompted to remit information such as the calling card number, PIN, and the destination number (DN) to send to the SCP. If the PIN matches the stored PIN, the transaction continues. If not, the user can be given extra tries to enter the correct PIN.

[0021] In the preferred embodiment, a service management system (SMS) or global service management system (GSMS) 120 is employed to provision the calling card account information stored in the system, and to send the needed information to the data-base of the SCP 118.

[0022] A calling card account subscriber can set up an account and establish security and other information related thereto via a customer service center or SMS/GSMS 120. After initial account set-up, modifications (of the PIN, for example) are also made via the SMS/GMS 120. The calling card account subscriber can connect to the SMS/GMS 120 through various means, including direct telephone connection, or by using a computer and Transmission Control Protocol/Internet Protocol (TCP/IP), a networking protocol.

[0023] A switch 124 that may include an SSP will route an approved telephone call to its final destination as mentioned above.

[0024] The interface between the SSP 116 and the SCP 118 uses the ETSI/INAP or ITU/INAP protocol for speed and compatibility. The interface between the SSP 116 and the OCP 115, and the interface between the SSP and TCP use a switch internal message flow, or a common channel signaling link or any type of protocols, as will be appreciated by those skilled in the art.

[0025] The voice mailbox 108 can be either a stand-alone unit linked to the switch (as shown in Figure 1), or a unit integrated into the switch (not shown). The voice mailbox has sufficient sub-addresses for voice mail subscriber accounts. The voice mailbox utilizes the User ID and password for secure access. The voice mail has at least one pre-recorded greeting which can be created and updated by the subscriber on-line.

[0026] The system and method of the present invention require that calling card numbers be assigned Virtual Destination Numbers (VDNs). Recall from the "Summary" section, that a VDN is a telephone number for identifying a telephone customer without associating a physical calling line or equipment. In the preferred embodiment, the prefixes of the VDNs distinguish them from other possible telephone numbers (i.e., the particular prefixes involved are reserved only for inclusion in VDNs). The SCP data-base contains a VDN mapping table (not shown) that stores for each calling card subscriber account, the calling card number, an assigned VDN, and a call forwarding number if applicable (see *infra*).

2. Calling Card Customer Telephone Calls

[0027] A calling card customer can make a telephone call first by dialing a SAC. Upon connection to the system 100/180 the customer enters the calling card number with the PIN. After verification by the SCP, the OCP prompts the customer with the following audible (although a screen can also visually duplicate the information in an alternate embodiment) VDN Calling Card Service Main Menu: "To make a phone call, press '1;' To check voice mailbox, press '2;' To create or update the greeting for voice mailbox, press '3;' To input call forwarding number, press '4;' and To exit, press '5.'" Those skilled in the art will appreciate that the menu can be different from the example given above.

[0028] When the customer enters "1" the system processes the telephone call normally, requesting entry of the destination number. The VDN is used as the original calling party number.

3. Checking the VDN Associated Voice Mailbox

[0029] When a calling card customer wishes to access his/her voice mailbox in a voice mailbox system 108 (see Figure 1), the customer dials a SAC, and then the calling card number PIN to reach the VDN Calling Card Service Main Menu, as previously described. The algorithm 200 in Figure 2 governs the rest of the transaction.

[0030] After the start (Step 202) of the algorithm, the user selects "2" from the menu corresponding to "check voice mailbox" (Step 204). In Step 206 the SCP finds the calling card customer's VDN from the VDN mapping table and sends a Connect operation signal to the SSP. The Connect Operation signal includes a series of bytes called a Destination Routing Address (DRA) which contains the initial information needed for

processing the call by the switch, including a Network Routing Address (NRA), a Nature of Address (NOA) portion, a destination number (DN) portion, an original called party ID ("originalCalledPartyID"), and a redirecting party ID (redirectingPartyID").

[0031] For this operation, the NOA portion of the DRA indicates voice mail, while the DN is set to "1" indicating access to the voice mail system (checking mail), the originalCalledPartyID portion contains the VDN, and the redirectingPartyID contains the calling card customer's PIN.

[0032] Next, the SSP routes the call to a voice mail system main menu and automatically transmits the customer's VDN as a voice mail ID, and the customer's PIN as the password (Step 208). The user can then check his/her mailbox for messages (Step 210). After checking the voice mailbox, the user can hang-up (Step 212), in which case the call is disconnected (Steps 214 and 220), or the user can input a code such as "*9" (Step 216) to reach the Calling Card Service Main Menu again for other transactions (Step 218).

[0033] If the user did not hang-up or enter "*9" in Step 216, he/she is returned to the voice mail system main menu for more voice mail operations including updating or changing greetings, described *infra*, for example.

4. Updating Greetings for the VDN Associated Voice Mailbox

[0034] A calling card customer can create or update voice mail greetings according to the algorithm 300 in Figure 3. After the start (Step 302) of the algorithm, the user selects "3" from the VDN Calling Card Service Main Menu corresponding to "up-date/change voice mail greeting" (Step 304). In Step 306 the SCP finds the calling card customer's VDN from the mapping table and sends a Connect Operation signal to the SSP. For this operation, the NOA portion of the DRA indicates voice mail, while the DN is set to "2" indicating access to the voice mail system for creating or changing greetings, the originalCalledPartyID portion contains the VDN, and the redirectingPartyID portion contains the calling card customer's PIN.

[0035] Next, the SSP routes the call to a voice mail system menu for greeting changes, and automatically transmits the customer's VDN as a voice mail ID, and the customer's PIN as the password (Step 308). The user can then create or change his/her mailbox greeting (Step 310). After changing the greeting, the user can hang-up (Step 312), in which case the call is disconnected (Steps 314 and 320), or the user can input "*9" (Step 316) to reach the Calling Card Service Main Menu again for other transactions (Step 318).

[0036] If the user did not hang-up or enter "*9" in Step 316, he/she is returned to the voice mail greeting change menu (Step 308) for further greeting change operations, etc.

5. VDN Associated Call Forwarding

[0037] A calling card customer can establish a call forwarding number where calls to the VDN will be transferred according to the algorithm 400 in Figure 4. After the start (Step 402) of the algorithm, the user selects "4" from the VDN Calling Card Service Main Menu corresponding to "call forwarding" (Step 404). In Step 406 the SCP (via the OCP) prompts the user to enter the desired call forwarding telephone number with an audible message such as "please enter the forwarding number followed by the pound sign."

[0038] In Step 408 the SCP voices back the digits received from the user so that the user can check for errors. In the preferred embodiment, the user is instructed to input a "1" confirmation digit if the digits of the call forwarding number are correct, and a "0" confirmation digit if the digits of the call forwarding number are incorrect. If the user has input "1" for the confirmation digit (Steps 410 and Step 412), the SCP updates the call forwarding number corresponding to the calling card number and VDN in the aforementioned VDN mapping table (Step 414). If the confirmation digit entered is "0" an error in the generation, transmission or reception of the call forwarding number digits has occurred, returning the algorithm to Step 406 for another iteration.

[0039] After successful establishment or updating of the call forwarding number, the user is returned to the VDN Calling Card Service Main Menu (Steps 416 and 418) for further transactions if desired.

6. Access to VDN and Associated Voice Mailbox by Third Parties

[0040] A third party dialing a customer's VDN can either reach a call forwarding telephone number if it has been established, or the calling card customer's voice mailbox. These transactions are governed by the algorithm 500 in Figure 5.

[0041] After the start of the algorithm (Step 502) a third party is connected to the SSP of a switch (e.g., 112) and enters the destination number. The prefix of the destination number indicates that the number is a VDN as described *supra*. In response the SSP sends an InitialDP signal to the SCP containing both a service key indicating a VDN has been called, and the VDN for the called party number (Step 504).

[0042] The SCP checks the VDN mapping table for a call forwarding number corresponding to the received VDN (Step 506). If there is an established call forwarding number, the SCP sends a Connect Operation signal to the SSP with a DRA containing the call forwarding number (Steps 508 and 512). This is followed by the SSP routing the call to the designated call forwarding number (Steps 516 and 518).

[0043] If no call forwarding number has been established for the VDN, the SCP sends a Connect Operation signal to the SSP with a DRA containing an NOA por-

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tion corresponding to voice mail, a destination number portion containing "3" for voice mail access, and the originalCalledPartyID portion containing the VDN (Steps 508 and 510). The SSP then routes the call to the voice mail system 108, and places the third party directly into the voice mailbox associated with the VDN (Step 514 and 518), where the third party can leave a voice mail message for the calling card customer.

[0044] Variations and modifications of the present invention are possible, given the above description. However, all variations and modifications which are obvious to those skilled in the art to which the present invention pertains are considered to be within the scope of the protection granted by this Letters Patent.

Claims

1. A telephone calling card service system for processing telephone calls to be charged to calling card accounts, said system comprising:

   a plurality of input telephonic devices operatively coupled to an origination telephone line, said input telephonic device comprising an alphanumeric information generator adapted to at least transmit a calling card account card number, security information, and a destination telephone number;

   an automated intelligent network (IN) coupled to origination telephone lines adapted to process calling card account telephone calls, said IN comprising a service control point (SCP), and said SCP comprising an SCP control unit and an SCP database coupled to said SCP control unit, said IN being adapted to authorize the routing of calling card account telephone calls; and

   at least one switch operatively coupled to said origination telephone line and to said SCP, said switch adapted to route calls authorized by said SCP to a destination number specified by said customer;

   said SCP database at least storing system account numbers, corresponding security information and an assigned Virtual Destination Number (VDN), and said SCP control unit, upon receipt of customer information collected via said origination telephone line, compares information and determines whether a telephone call is authorized; and

   said SCP being adapted to provide additional services to said customer and third parties based upon said VDN.

2. The system in Claim 1, further comprising a calling card customer voice mailbox, and wherein said additional services comprise accessing said calling card customer voice mailbox.

3. The system in Claim 2, wherein said additional services comprise creating or modifying greetings associated with said calling card customer voice mailbox.

4. The system in Claim 1, wherein said additional services comprise the establishment and use of call forwarding.

5. The system in Claim 1, wherein said SCP stores a mapping table at least having calling card numbers, assigned VDNs, and associated call forwarding numbers.

6. The system in Claim 1, further comprising at least one calling card account subscriber voice mailbox with sufficient sub-addresses for calling card account subscribers in the system, said voice mailbox also utilizing user ID and passwords for secure access, and said voice mailbox also generating a greeting updatable by a subscriber on-line.

7. A telephone calling card service method for processing telephone calls to be charged to calling card accounts, said method comprising the steps of:

   via input telephonic devices coupled to origination telephone lines, at least transmitting a calling card account card number, security information, and a destination telephone number;

   via an automated intelligent network (IN) coupled to origination telephone lines, processing calling card account telephone calls, said IN comprising a service control point (SCP), and said SCP comprising an SCP control unit and an SCP database coupled to said SCP control unit, authorizing the routing of calling card account telephone calls; and

   via at feast one switch operatively coupled to said origination telephone line and to said SCP, routing calls authorized by said SCP to a destination number specified by said customer;

   said SCP database at least storing system account numbers, corresponding security information and an assigned Virtual Destination Number (VDN), and said SCP control unit, upon receipt of customer information collected via said origination telephone line, comparing

information and determining whether a telephone call is authorized; and

providing additional services to said customer and third parties based upon said VDN.

8. The method in Claim 7, further comprising the step of providing a calling card customer voice mailbox, wherein said additional services comprise accessing said calling card customer voice mailbox.

9. The method in Claim 8, wherein said additional services comprise creating or modifying greetings associated with said calling card customer voice mailbox.

10. The method in Claim 7, wherein said additional services comprise the establishment and use of call forwarding.

11. The method in Claim 7, wherein said SCP stores a mapping table at least having calling card numbers, assigned VDNs, and associated call forwarding numbers.

12. The method in Claim 7, further comprising the step of providing at least one calling card account subscriber voice mailbox with sufficient sub-addresses for calling card account subscribers in the system, said voice mailbox also utilizing user ID and passwords for secure access, and said voice mailbox also generating a greeting up-datable by a subscriber on-line.

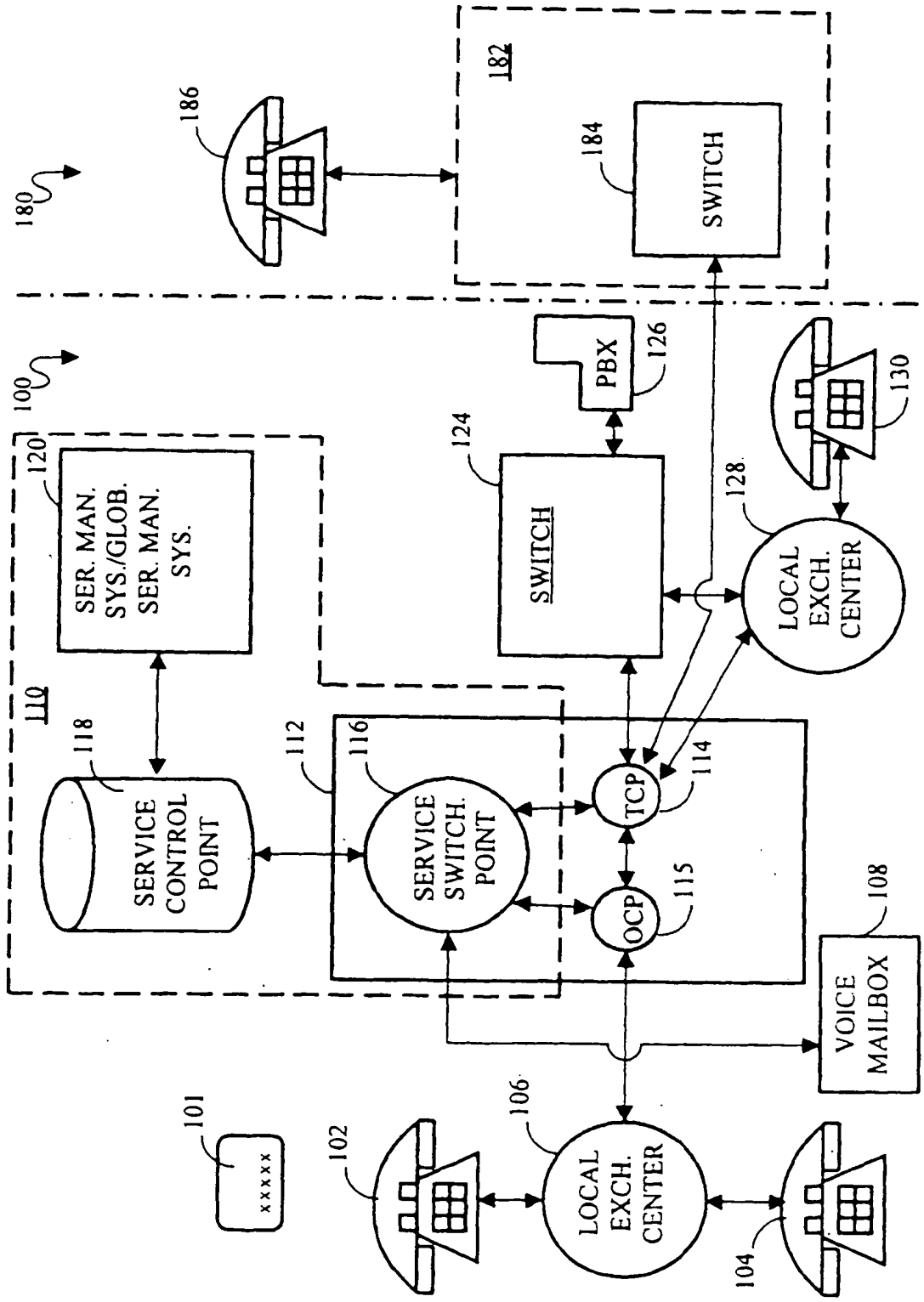
180
182
186
184
SWITCH
100
PBX
126
124
120
SER. MAN. SYS./GLOB. SER. MAN. SYS.
SWITCH
128
130
LOCAL EXCH. CENTER
110
118
112
116
114
SERVICE CONTROL POINT
SERVICE SWITCH. POINT
TCP
OCP
115
108
VOICE MAILBOX
101
XXXXX
102
106
LOCAL EXCH. CENTER
104

FIGURE 1

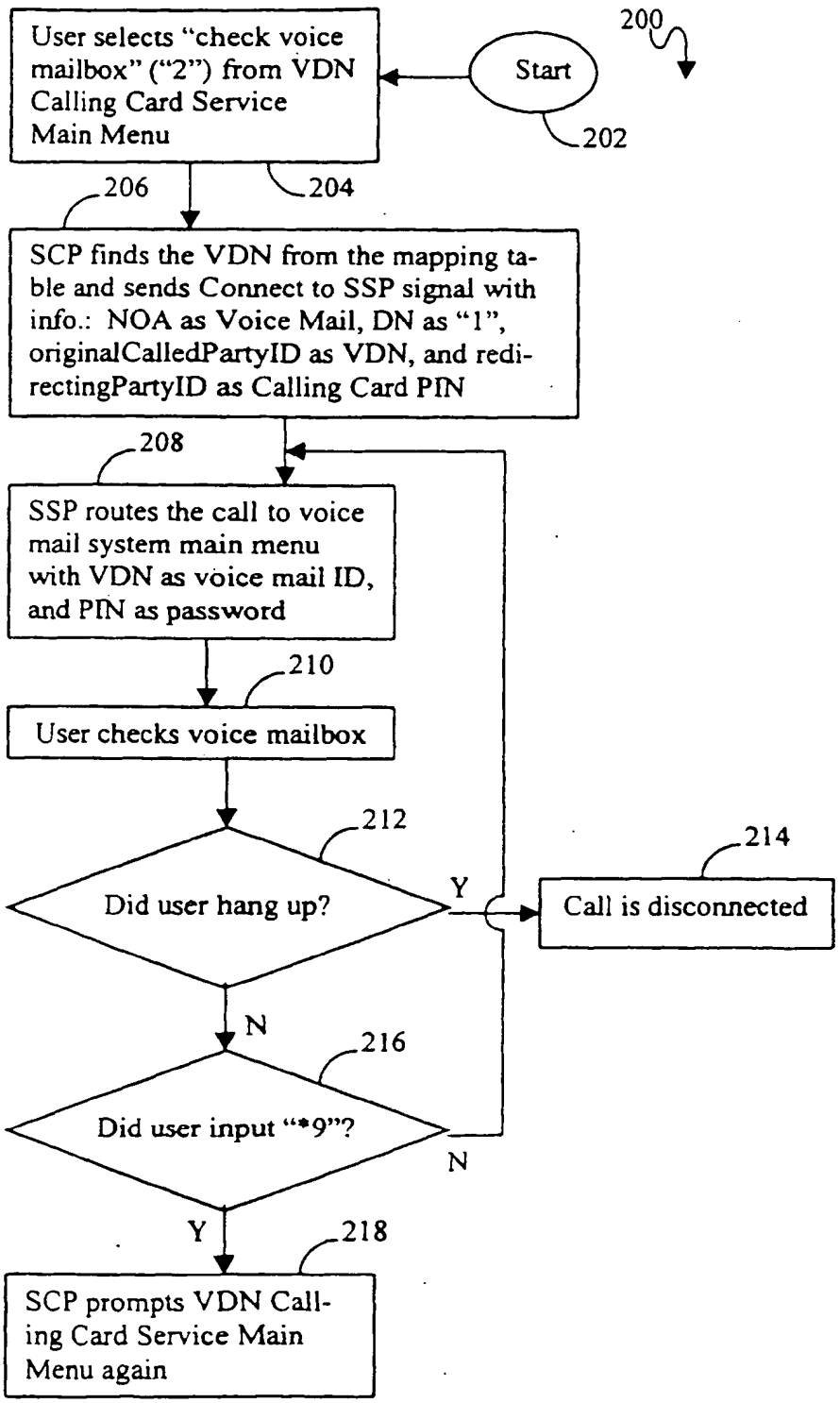
200
Start
202
User selects "check voice mailbox" ("2") from VDN Calling Card Service Main Menu
204
206
SCP finds the VDN from the mapping table and sends Connect to SSP signal with info.: NOA as Voice Mail, DN as "1", originalCalledPartyID as VDN, and redirectingPartyID as Calling Card PIN
208
SSP routes the call to voice mail system main menu with VDN as voice mail ID, and PIN as password
210
User checks voice mailbox
212
Did user hang up?
Y
214
Call is disconnected
N
216
Did user input "*9"?
N
Y
218
SCP prompts VDN Calling Card Service Main Menu again

FIGURE 2

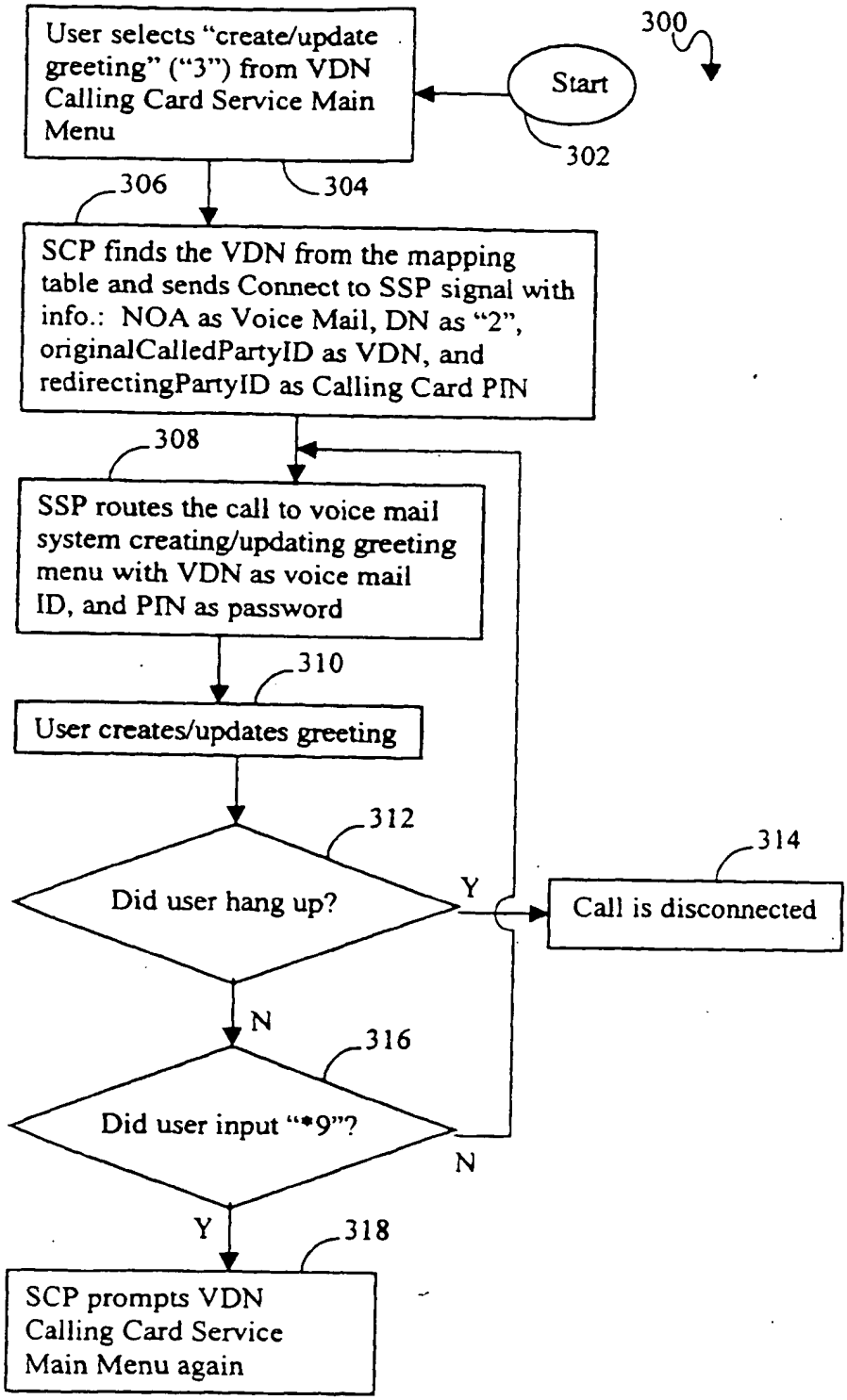
300
Start
302
User selects "create/update greeting" ("3") from VDN Calling Card Service Main Menu
304
306
SCP finds the VDN from the mapping table and sends Connect to SSP signal with info.: NOA as Voice Mail, DN as "2", originalCalledPartyID as VDN, and redirectingPartyID as Calling Card PIN
308
SSP routes the call to voice mail system creating/updating greeting menu with VDN as voice mail ID, and PIN as password
310
User creates/updates greeting
312
Did user hang up?
Y
314
Call is disconnected
N
316
Did user input "*9"?
N
Y
318
SCP prompts VDN Calling Card Service Main Menu again

FIGURE 3

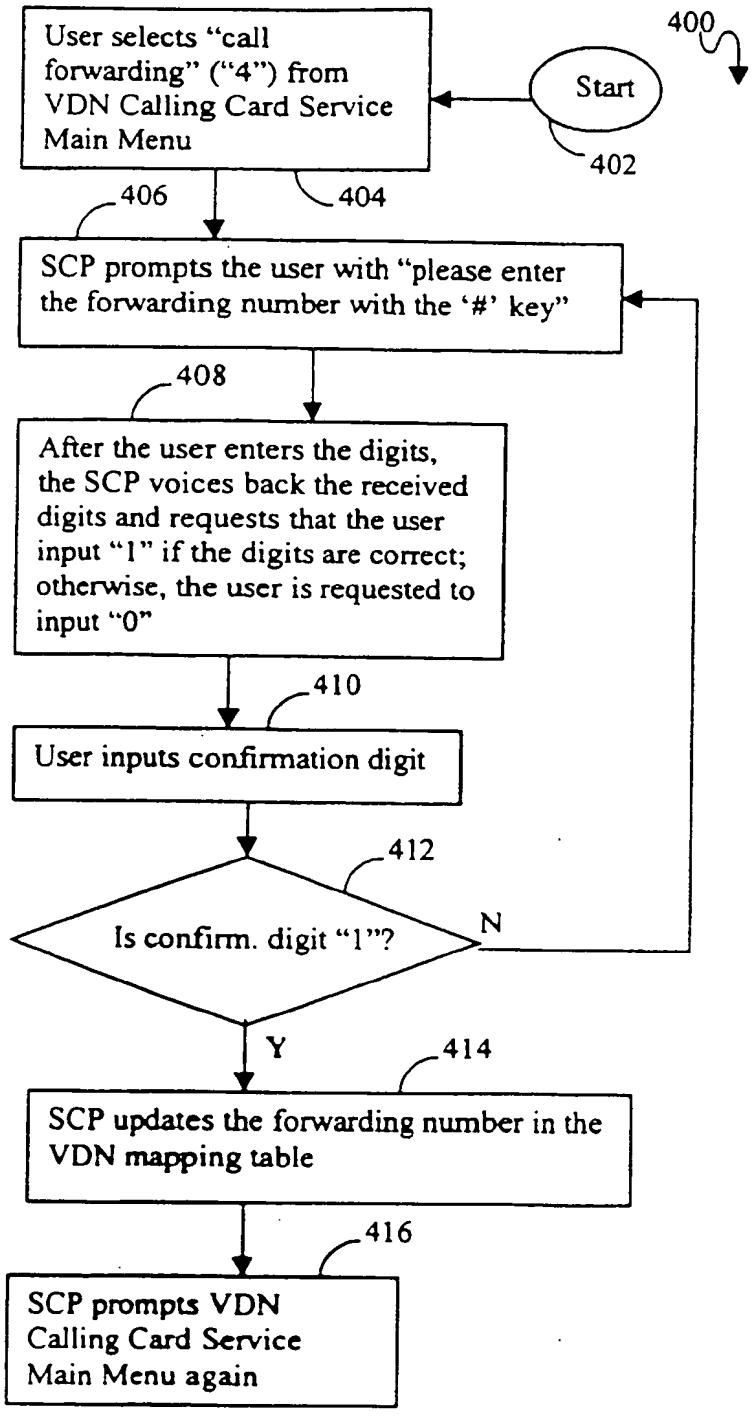
400
Start
402
User selects "call forwarding" ("4") from VDN Calling Card Service Main Menu
404
406
SCP prompts the user with "please enter the forwarding number with the '#' key"
408
After the user enters the digits, the SCP voices back the received digits and requests that the user input "1" if the digits are correct; otherwise, the user is requested to input "0"
410
User inputs confirmation digit
412
Is confirm. digit "1"?
N
Y
414
SCP updates the forwarding number in the VDN mapping table
416
SCP prompts VDN Calling Card Service Main Menu again

FIGURE 4

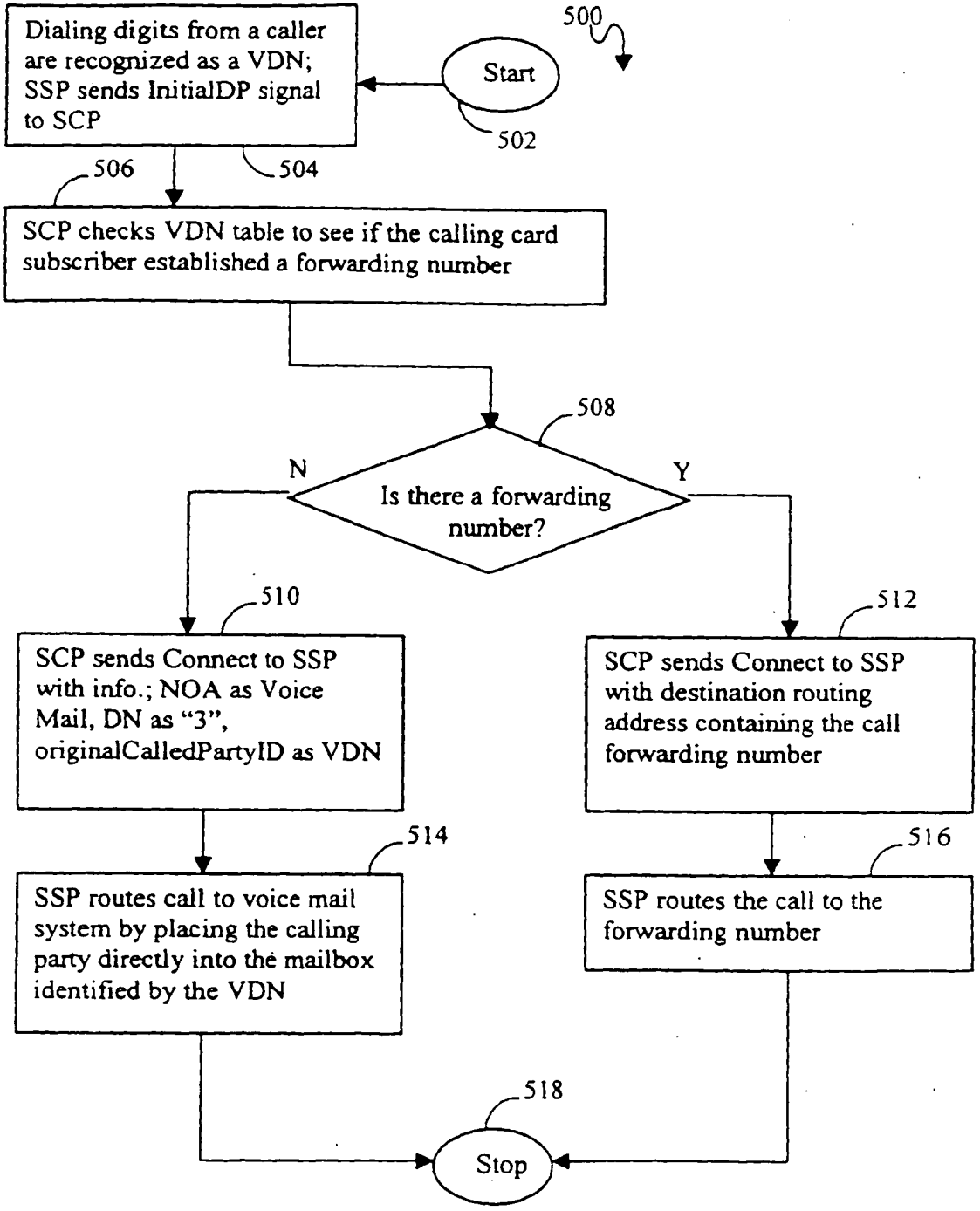
500
Start
502
Dialing digits from a caller are recognized as a VDN; SSP sends InitialDP signal to SCP
504
506
SCP checks VDN table to see if the calling card subscriber established a forwarding number
508
Is there a forwarding number?
N
Y
510
SCP sends Connect to SSP with info.; NOA as Voice Mail, DN as "3", originalCalledPartyID as VDN
512
SCP sends Connect to SSP with destination routing address containing the call forwarding number
514
SSP routes call to voice mail system by placing the calling party directly into the mailbox identified by the VDN
516
SSP routes the call to the forwarding number
518
Stop

FIGURE 5